

Contents

Preface · ix

1 Getting Started · 1

Launching Mathematica · The Basic Technique for Using Mathematica · The First Computation · Commands for Basic Arithmetic · Input and Output · The BasicMathInput Palette · Decimal In, Decimal Out · Use Parentheses to Group Terms · Three Well-Known Constants · Typing Commands in Mathematica · Saving Your Work and Quitting Mathematica · Frequently Asked Questions About Mathematica's Syntax

2 Working with Mathematica · 27

Opening Saved Notebooks · Adding Text to Notebooks · Printing · Creating Slide Shows · Creating Web Pages · Converting a Notebook to Another Format · Mathematica's Kernel · Tips for Working Effectively · Getting Help from Mathematica · Loading Packages · Troubleshooting

3 Functions and Their Graphs · 51

Defining a Function · Plotting a Function · Using Mathematica's Plot Options · Investigating Functions with Manipulate · Producing a Table of Values · Working with Piecewise Defined Functions · Plotting Implicitly Defined Functions · Combining Graphics · Enhancing Your Graphics · Working with Data · Managing Data—An Introduction to Lists · Importing Data · Working with Difference Equations

4 Algebra · 147

Factoring and Expanding Polynomials · Finding Roots of Polynomials with Solve and NSolve · Solving Equations and Inequalities with Reduce · Understanding Complex Output · Working with Rational Functions · Working with Other Expressions · Solving General Equations · Solving Difference Equations · Solving Systems of Equations

5 Calculus · 195

Computing Limits · Working with Difference Quotients · The Derivative · Visualizing Derivatives · Higher Order Derivatives · Maxima and Minima · Inflection Points · Implicit Differentiation · Differential Equations · Integration · Definite and Improper Integrals · Numerical Integration · Surfaces of Revolution · Sequences and Series

6 Multivariable Calculus · 251

Vectors · Real-Valued Functions of Two or More Variables · Parametric Curves and Surfaces · Other Coordinate Systems · Vector Fields · Line Integrals and Surface Integrals

7 Linear Algebra · 335

Matrices · Performing Gaussian Elimination · Matrix Operations · Minors and Cofactors · Working with Large Matrices · Solving Systems of Linear Equations · Vector Spaces · Eigenvalues and Eigenvectors · Visualizing Linear Transformations

8 Programming · 385

Introduction · FullForm: What the Kernel Sees · Numbers · Map and Function · Control Structures and Looping · Scoping Constructs: With and Module · Iterations: Nest and Fold · Patterns

Solutions to Exercises · www.cambridge.org/books/torrence

Index · 461